Supplemental files:

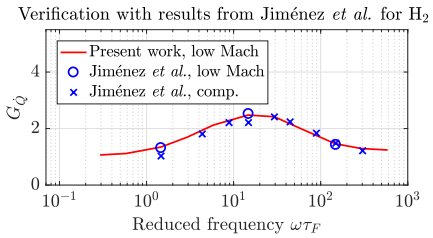

Figure S.1: Normalized gain of the heat release fluctuations as a function of the reduced frequency, for Case 1 (hydrogen). The red line is from the present study, and the circles are numerical results reported by Jimenez *et al.* [5]

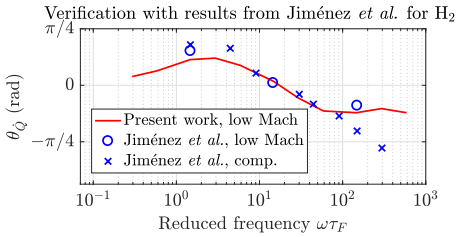

Figure S.2: Phase angle of the heat release fluctuations as a function of the reduced frequency, for Case 1 (hydrogen). The red line is from the present study, and the circles are numerical results reported by Jimenez *et al.* [5]

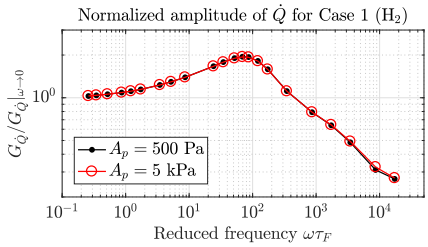

Figure S.3: Comparison of the normalized amplitude of $\dot{Q}$ for Case 1 (H_2) at $A_p = 500$ Pa and 5 kPa

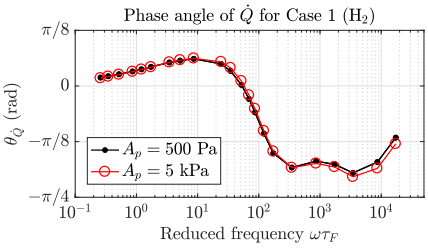

Figure S.4: Comparison of the phase angle of $\dot{Q}$ for Case 1 (H_2) at $A_p = 500$ Pa and 5 kPa.

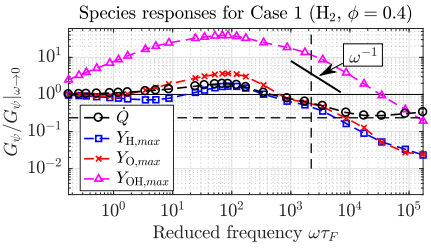

Figure S.5: Normalized gain of heat release (black circles) and different intermediate species (H radical [blue squares], O radical [red crosses], and OH [pink triangles] for Case 1 (H_2).

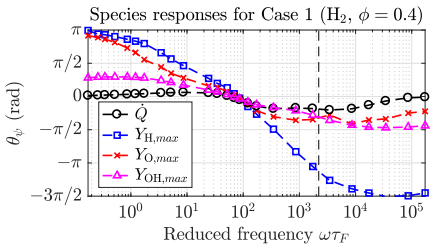

Figure S.6: Phase angle of heat release (black circles) and different intermediate species (H radical [blue squares], O radical [red crosses], and OH [pink triangles] for Case 1 (H_2).

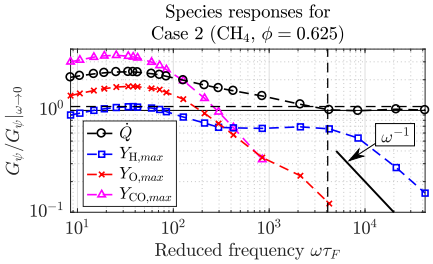

Figure S.7: Normalized gain of heat release (black circles) and different intermediate species (H radical [blue squares], O radical [red crosses], and CO [pink triangles] for Case 2 (CH_4).

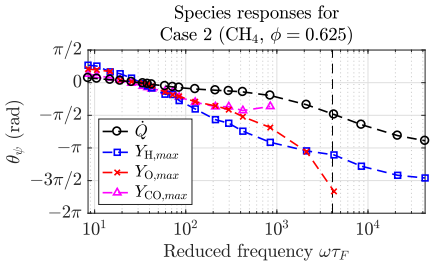

Figure S.8: Phase angle of heat release (black circles) and different intermediate species (H radical [blue squares], O radical [red crosses], and CO [pink triangles] for Case 2 (CH_4).

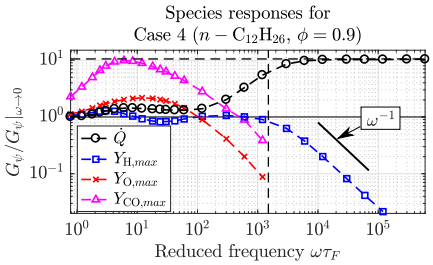

Figure S.9: Normalized gain of heat release (black circles) and different intermediate species (H radical [blue squares], O radical [red crosses], and CO [pink triangles] for Case 4 ($n - C_{12}H_{26}$).

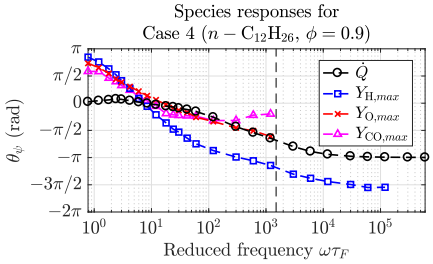

Figure S.10: Phase angle of heat release (black circles) and different intermediate species (H radical [blue squares], O radical [red crosses], and CO [pink triangles] for Case 4 ($n - C_{12}H_{26}$).

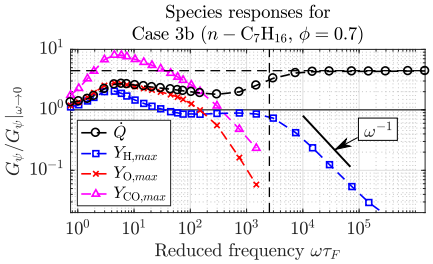

Figure S.11: Normalized gain of heat release (black circles) and different intermediate species (H radical [blue squares], O radical [red crosses], and CO [pink triangles] for Case 3b ($n - C_7H_{16}$ at $\phi = 0.7$).

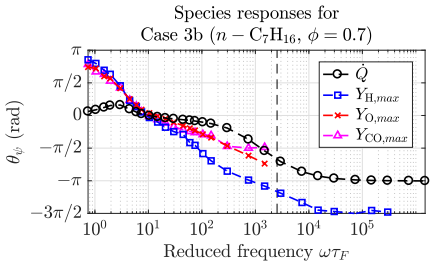

Figure S.12: Phase angle of heat release (black circles) and different intermediate species (H radical [blue squares], O radical [red crosses], and CO [pink triangles] for Case 3b ($n-C_7H_{16}$ at $\phi = 0.7$).

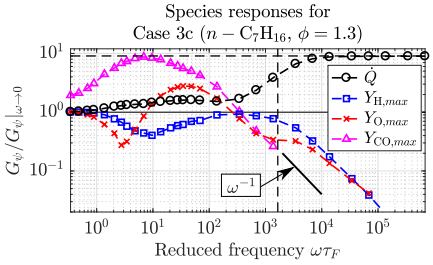

Figure S.13: Normalized gain of heat release (black circles) and different intermediate species (H radical [blue squares], O radical [red crosses], and CO [pink triangles] for Case 3c ($n-C_7H_{16}$ at $\phi = 1.3$).

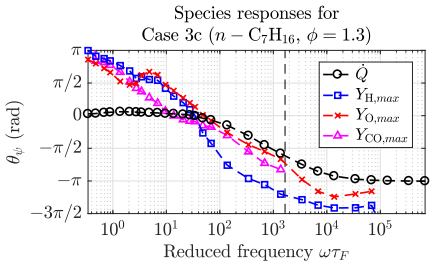

Figure S.14: Phase angle of heat release (black circles) and different intermediate species (H radical [blue squares], O radical [red crosses], and CO [pink triangles] for Case 3c ($n-C_7H_{16}$ at $\phi = 1.3$).

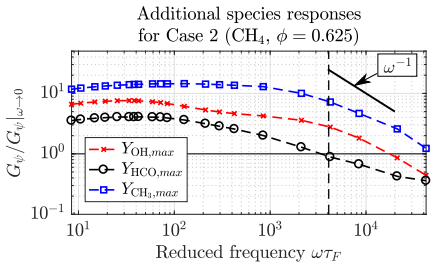

Figure S.15: Normalized gain of different intermediate species: OH [red crosses], HCO [black circles], and CH_3 [blue squares] for Case 2 (CH_4).

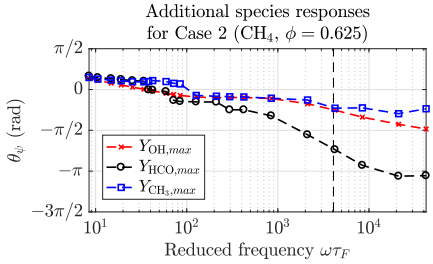

Figure S.16: Phase angle of different intermediate species: OH [red crosses], HCO [black circles], and CH_3 [blue squares] for Case 2 (CH_4).

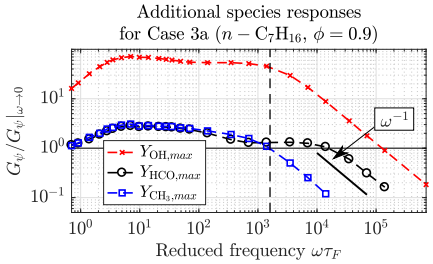

Figure S.17: Normalized gain of different intermediate species: OH [red crosses], HCO [black circles], and CH_3 [blue squares] for Case 3a ($n-C_7H_{16}$ at $\phi = 0.9$).

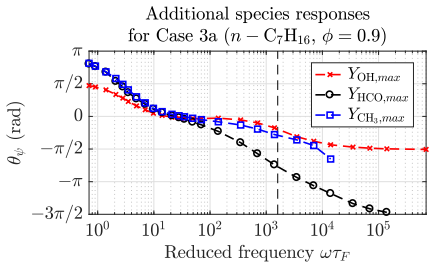

Figure S.18: Phase angle of different intermediate species: OH [red crosses], HCO [black circles], and CH_3 [blue squares] for Case 3a ($n-C_7H_{16}$ at $\phi = 0.9$).

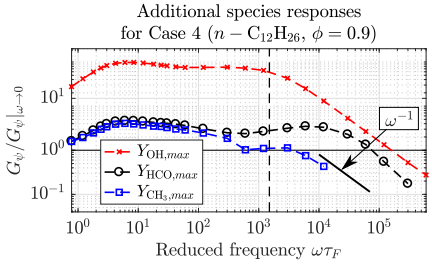

Figure S.19: Normalized gain of different intermediate species: OH [red crosses], HCO [black circles], and CH_3 [blue squares] for Case 4 ($n-C_{12}H_{26}$).

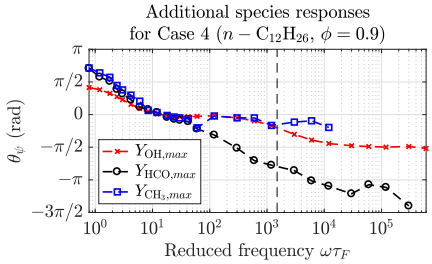

Figure S.20: Phase angle of different intermediate species: OH [red crosses], HCO [black circles], and CH_3 [blue squares] for Case 4 ($n-C_{12}H_{26}$).

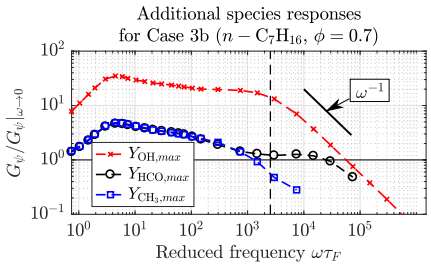

Figure S.21: Normalized gain of different intermediate species: OH [red crosses], HCO [black circles], and CH_3 [blue squares] for Case 3b ($n - C_7H_{16}$ at $\phi = 0.7$).

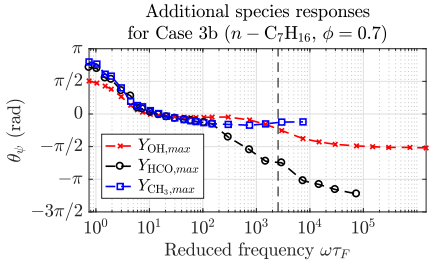

Figure S.22: Phase angle of different intermediate species: OH [red crosses], HCO [black circles], and CH_3 [blue squares] for Case 3b ($n - C_7H_{16}$ at $\phi = 0.7$).

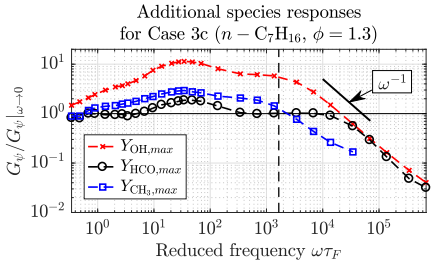

Figure S.23: Normalized gain of different intermediate species: OH [red crosses], HCO [black circles], and CH_3 [blue squares] for Case 3c ($n - C_7H_{16}$ at $\phi = 1.3$).

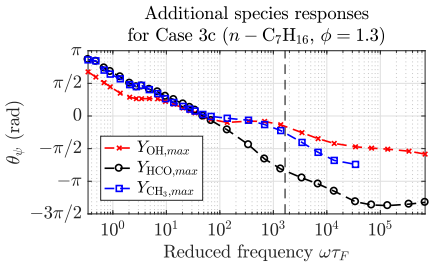

Figure S.24: Phase angle of different intermediate species: OH [red crosses], HCO [black circles], and CH_3 [blue squares] for Case 3c ($n - C_7H_{16}$ at $\phi = 1.3$).